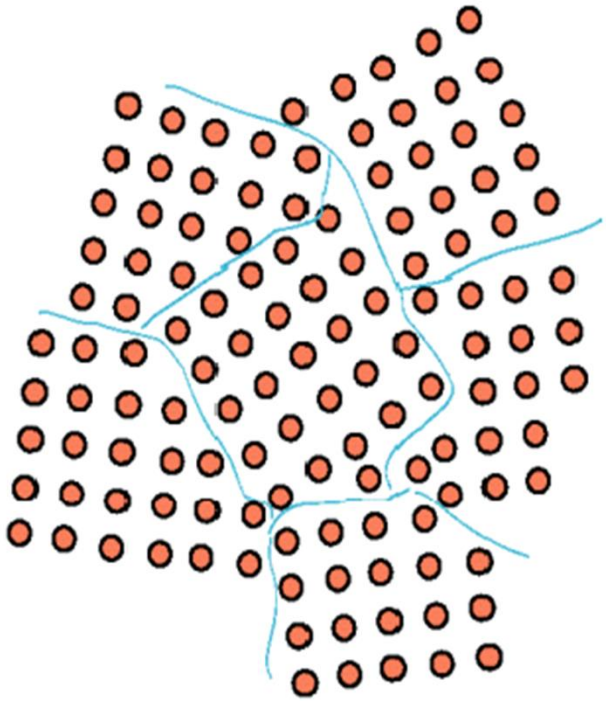
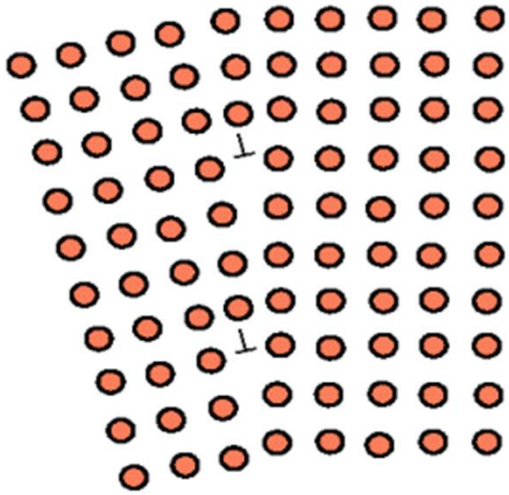
A) Grain Boundaries

- A Grain Boundary is a general planar defect that separates regions of different crystalline orientation (i.e. *grains*) within a polycrystalline solid . Grain boundaries are usually the result of uneven growth when the solid is crystallizing.



B) *Tilt Boundaries*

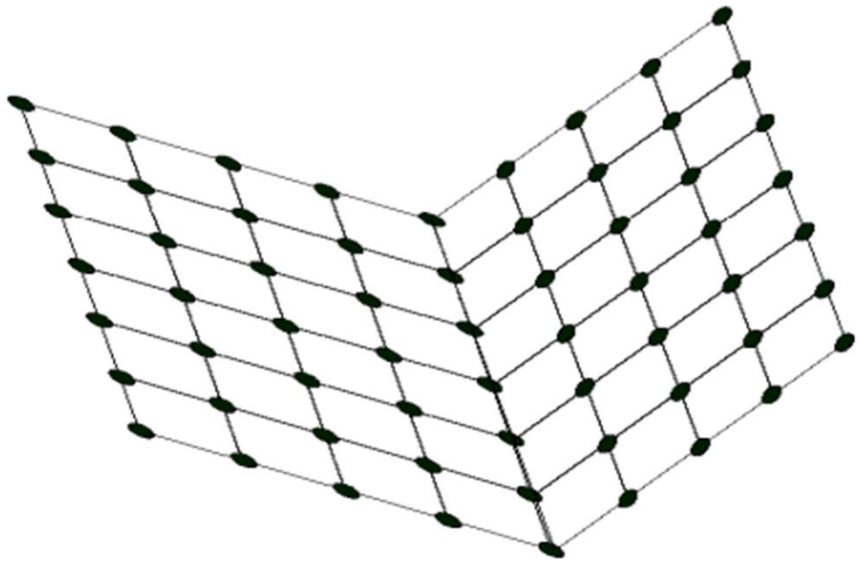
- When the angle between two crystals is less than 10 ,the distortion is not so drastic as to be compared with a non crystalline material .They are also called low angle boundaries.
- It can be described as set of parallel, equally spaced edge dislocation of same sign located one above other.
- A Tilt Boundary, between two slightly mis-aligned grains appears as an *array of edge dislocations*.



C) *Twin Boundaries*

- These are the boundaries in the grains at which the atomic arrangement on one side of the boundary is the mirror image of the atoms on the other side .The volume of material which has an orientation similar to the mirror image of the matrix orientation is called a twin.

- The plane is called *twinning plane*.



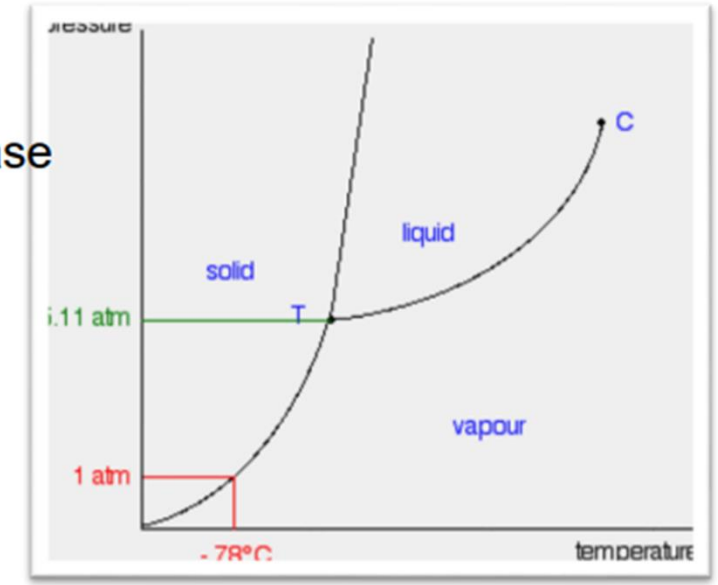
DEFINITION OF PHASE

Phase is Homogenous, physically distinct and mechanically separable part of the system

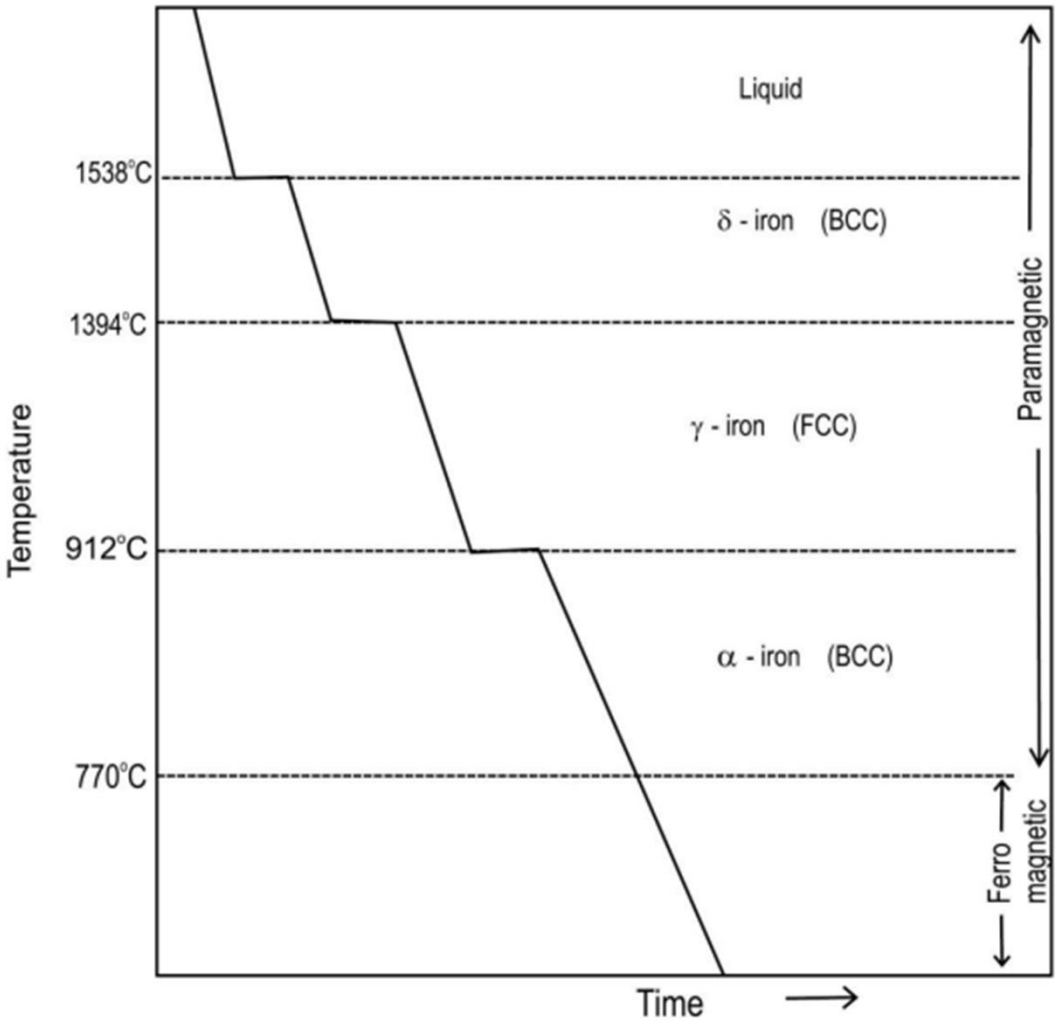
Phase diagram for pure substance

Pure substance- It is a substance constant Chemical composition throught its mass .
it may exist in one phase or more than one phase

If you look at the diagram, you will see that there are three lines, three areas marked "solid", "liquid" and “Vapour", and two special points marked "C" and "T".

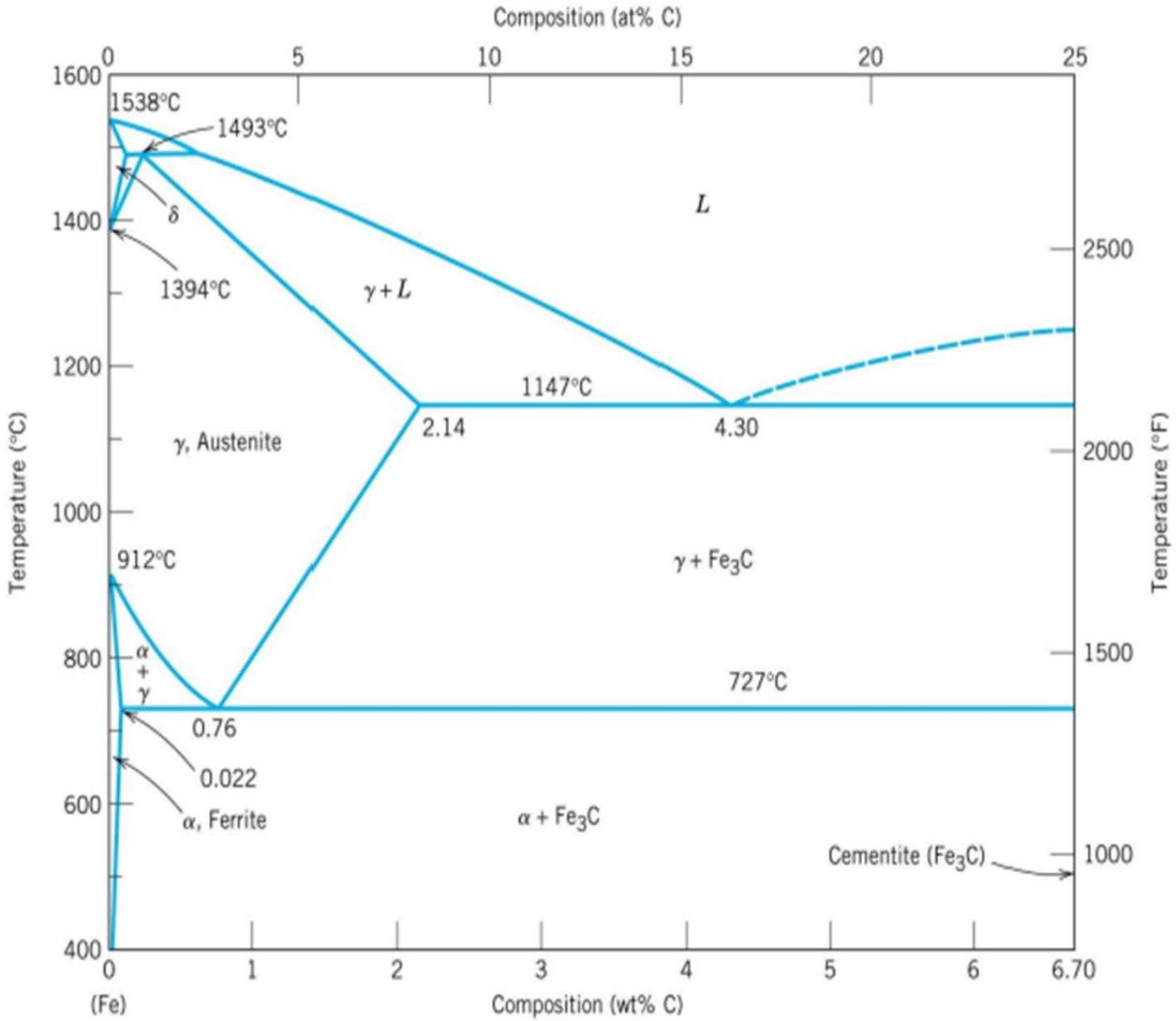


Cooling curve for pure iron

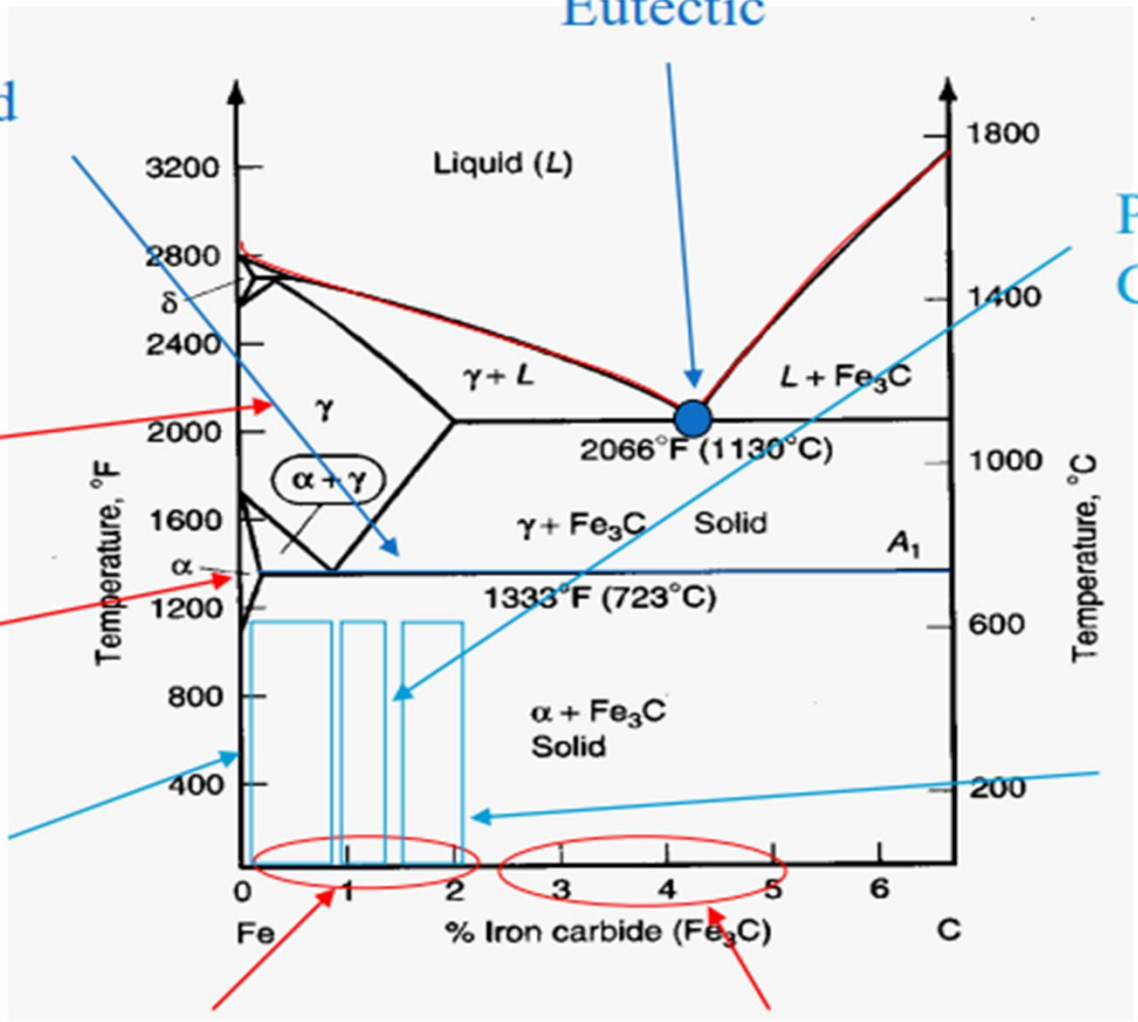


IRON-CARBON (Fe-C) PHASE DIAGRAM

Pure iron: 3 solid phases
BCC ferrite (α)
FCC Austenite (γ)
BCC δ
Beyond 6.7% C
cementite (Fe3C)
Eutectic: 4.3% C
L - γ + Fe3C
(L -solid + solid)
Eutectoid: 0.76% C
γ + α + Fe3C
(solid - solid + solid



How to read the Fe-C phase diagram



Eutectic

eutectoid

Pearlite and Cementine

Austenite

Ferrite

Pearlite

Pearlite and Carbide

Steel

Cast iron